NISTTech

Superconducting Transition-Edge Sensor (TES)

Particle detection using normal superconductor bilayers for superconducting TES

Abstract

This invention provides a method and apparatus for particle detection utilizing an Al/normal-metal bilayer transition-edge sensor (TES) coupled with a particle absorber. The TES is maintained in the transition region where its properties are extremely sensitive to temperature. In the detector, the energy of an absorbed particle is converted to heat by the absorber and the transition from the bilayer's superconducting to normal state is used to sense the temperature rise. The transition temperature, T_C, of the bilayer can be reproducibly controlled as a function of the relative thicknesses and the total thickness of the superconducting and normal-metal layers. The range of available T_C's extends from below 50 mK to above 1 K, allowing the detector to be tailored to the application. For x-ray detection the preferred T_C is about 50-150 mK. The width of the transition edge can be less than 0.1 mK, which allows very high detector sensitivity.

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References

- U.S. Patent # 5,880,468
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Status of Availability

This technology is available in the public domain.

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